

## Management of mustard aphid, *Lipaphis erysimi* (Kalt.) by use of an entomopathogenic fungi, *Verticillium lecani* under field conditions

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### **Abstract**

Entomopathogenic fungi, *Verticillium lecani* has been considered to be pathogenic to a wide range of insect-pests including aphids, thrips and white fly (Brownbridge, 1995; Hall and Burges, 1979; Hall, 1982; Heyler, Gill, Baywater and Chambers, 1992). Its efficacy as a tool of biological control of mustard aphid, *Lipaphis erysimi* was tested under field conditions for two consecutive years. Based upon observations of two years, it was concluded that *V. lecani* is an effective fungus for the control of mustard aphid, a predominant species of aphid in rapeseed and mustard crop in subtropical regions of Indian subcontinent. The results for the two years depicted that the mustard aphid population declined significantly a week after applications of this fungus. During both the year an aphid infestation index of 1.2 (on a 5 point scale) was reduced to 0.3 and 0.1, respectively after a week and 10 days of spray with  $10^8$  spore suspension of *V. lecani*. Use of surfactant in the form of rapeseed mustard oil @ 0.1% was very useful for uniform spread of the fungal spore formulation. A concentration of  $10^{10}$  conidial spores per ml and  $10^{12}$  spores per ml dosages gave still better results but these were observed to be statistically at par with that of  $10^8$ .

### **Introduction**

Among traditional oilseed crops, rapeseed, *Brassica rapa* and Indian mustard (*Brassica juncea*) are the major ones. These crops are basically used for the production oil, which is ultimately used for accomplishing significant part of the dietary needs of human being. Many pests attack these crops during its different growth stages out of which mustard aphid, *Lipaphis erysimi* is the most serious and inflict heavy crop losses (Bakhetia and Sekhon, 1984; Brar *et al.*, 1987; Joshi *et al.*, 1989). A number of pesticides are being used to manage this

pest, which in turn contributes to environmental pollution. Due to ever rising awareness and ill effects of these chemicals to human health there is a need for some alternative methods of pest control. *Verticillium lecani* is one of the entomopathogens, primarily used for aphids and scales in tropical regions (McClelland & Tucker, 1929; Viegas, 1939; Baird, 1958). This fungi has been tested widely for the control of three different aphid species viz. *Myzus persicae*, *Macrosiphoniella sanborni* and *Brachycaudus helichrysi* (Hall and Burges, 1979). There is no recorded reference of this fungus being used for the management of *Lipaphis erysimi*. Keeping the lack of information on the efficacy of this fungus on this particular aphid species, it was proposed to study the management aspects of mustard aphid, *Lipaphis erysimi* by use of different dosages of this fungus.

### **Materials and Methods**

'Sarson', *B. rapa* cv. BSH 1 and Indian mustard, *Brassica juncea* cv. RH 30 were sown in the field following all the general package of practices for growing healthy crop of the above crop varieties (Anon., 2003). The fungal suspension was made as per standard procedure and sprayed as tank mix after mixing the formulation with mustard oil (0.1%) to facilitate proper spread. A plot size of 200 m<sup>2</sup> with five replication was kept for the experimentation. The experiment was conducted for two consecutive years. The suspension was sprayed only at a time when economic threshold level of mustard aphid (13-15 aphids/plant) was attained. The observation on aphid infestation was recorded as aphid infestation index (All) on a 0-5 point scale.

### **Results and Discussion**

The results presented in Table.1. revealed that by the use of *V. lecanii* as tank mixed solution against mustard aphid, an aphid infestation index of 1.2 was reduced to 0.3 and 0.1 at 7 and 10 days after spray with an average of 0.20. In second higher dose (10<sup>10</sup> spores/ml), the All of 1-5 was reduced to 0.5 and 0.19 at 7 and 10 days of spray with an average of 0.36. In still higher dosage of 10<sup>12</sup> spores per ml an aphid infestation index of 1.4 was reduced to 0.3, 0.12 at 7 and

10 days after spray, respectively with an average of 0.21. When compared statistically, it was concluded that aphid control in 7 days and 10 days after spray columns, the figures were at par with one another. The average figures were however, significantly differing in  $10^{10}$  spores/ml from the other ones.

The results of the second year presented in Table 2 revealed that an aphid infestation index of 1.24 was reduced to 0.32 and 0.12 at 7 and 10 days after spray with an average of 0.22. In second dose of  $10^{10}$  spores/ml, the All of 1.32 was reduced to 0.41 and 0.11, respectively at 7 and 10 days after spray with an average of 0.26. The highest dosage of  $10^{12}$  spore/ml revealed that an All of 1.56 was reduced to 0.40 and 0.19 at 7 and 10 days after spray, respectively. Statistically the results of both the periods were non-significant and at par across all the dosages of fungal spores. However, average figures were statistically different from one another.

## Discussion

The results achieved during the experimentation have revealed that *V. lecani* from gone very good and consistent results as far as center of mustard aphid, *Lipaphis erysimi* is concluded during both the years of study. During the experimentation, it was concluded that even one spray with the proper suspension of the fungi can give very good control at a week after spray, which further increase beyond this period. The activity of this pest in the flower whorl sometimes prevent it from insecticides contact but the fungus can establish contact with the aphid very well in such situation where enough moisture is available for its multiplication. Although, the climatic condition in this part of India are extreme in summer but the rapeseed and mustard crop being grown in a season when temperature is mild provides a suitable conditions for the multiplication of this aphid as well as fungal spores. The above control hypothesis of this aphid may be supported by the possibility of restless nature of the aphid as reported in *Myzus persicae* which is similar in habits to that of *Lipaphis erysimi* (Wyatt, 1965; Bonnemaism, 1951; Bald, Norris & Helson, 1950; Hussey *et al.*, 1969).

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**Table 1. Efficacy of *V. lecanii* against mustard aphid during the year 2001-02.**

Treatment	Dosage	All			
		Before spray	Days after spray		
			7	10	Average
<i>V. lecanii</i>	10 <sup>8</sup>	1.2	0.3	0.1	0.20 <sup>a</sup>
<i>V. lecanii</i>	10 <sup>10</sup>	1.5	0.54	0.19	0.36 <sup>b</sup>
<i>V. lecanii</i>	10 <sup>12</sup>	1.4	0.3	0.12	0.21 <sup>a</sup>
C.D. at 5%	N.S.	N.S.	N.S.	N.S.	0.05

Figures super scribed with same letter are at par with one another.

**Table 2. Efficacy of *V. lecanii* against mustard aphid during the year 2002-03.**

Treatment	Dosage	All			
		Before spray	Days after spray		
			7	10	Average
<i>V. lecanii</i>	10 <sup>8</sup>	1.24	0.32	0.12	0.22 <sup>a</sup>
<i>V. lecanii</i>	10 <sup>10</sup>	1.32	0.41	0.11	0.26 <sup>b</sup>
<i>V. lecanii</i>	10 <sup>12</sup>	1.56	0.40	0.19	0.29 <sup>a</sup>
C.D. at 5%	N.S.	N.S.	N.S.	N.S.	0.04

Figures super scribed with same letter are at par with one another.